



## Field anthropology: application to burial contexts in prehistoric Southeast Asia

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### ABSTRACT

The context of burials in archaeological sites, that is whether the body was inhumed, wrapped, or in a coffin, is an aspect of mortuary ritual that has been missing from English-language publications on the subject. This is despite the development and use in France over at least the last two decades of methods of determining the context under the rubric '*l'Anthropologie de Terrain*', or Field Anthropology. This paper briefly reviews the methods and applies them to prehistoric burial samples from two sites in Southeast Asia. This shows that burials at the Bronze Age site of Ban Lum Khao were either in coffins or wrapped. The practice of coffin burial appears to have been abandoned later, as all burials at the nearby Iron Age site of Noen U-Loke were wrapped.

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### 1. Introduction

Mortuary rituals are a widely researched aspect of archaeology. There is an extensive literature on mortuary analysis, considering particularly the nature and significance of grave goods, associated mortuary structures and the size and spatial distribution of burials (e.g. Beck, 1995; Parker Pearson, 1999). The cemetery evidence is most frequently used in interpreting the social status of individuals and the socio-political organisation of the community.

The context of a burial, whether in a coffin, wrapped in fabric or fibrous material such as matting or interred directly in the soil without any covering, is an aspect of mortuary behaviour that is rarely included in mortuary analysis. Its identification would make a valuable contribution but has been elusive. On occasion, excavators have the good fortune to recover surviving evidence of investment in the structure of a grave such as remnants of wooden coffins, clay or stone grave lining, or postholes indicating a mortuary structure. Usually the burial context is left unidentified.

This is despite the development in the 1970's by French anthropologist Henri Duday of an approach to burial archaeology called '*l'Anthropologie de Terrain*', or Field Anthropology. This was based on work done even earlier, on Neolithic group burials by another French researcher, André Leroi-Gourhan, in 1962 (Roksandic, 2002). Field anthropology uses meticulous identification of the spatial relationships of bones in a grave, allowing interpretation of how they moved as the body decomposed and from this,

conceptualisation of the original burial context. The aims of this paper are to briefly review the development and concepts of Field Anthropology and to apply the method to interpret the context of burials in two late prehistoric cemeteries in Northeast Thailand.

### 2. Field anthropology

Over the past three decades field anthropology has further developed in France, completely revolutionising the approach taken by French archaeologists to mortuary analysis so it is now considered a fundamental component (Duday et al., 1990a; Maurice and Sellier, 1996). It has, however, not been adopted outside of francophone archaeology until recently (Nilsson Stutz, 2003a). This is possibly purely a consequence of the language barrier, although there may also be an element of the perception that archaeology and bioarchaeology are different fields with different research objectives. Traditionally, archaeologists have undertaken excavations and completed mortuary analyses using material and spatial evidence while bioarchaeologists have concentrated on the human biology of the interments.

French archaeologists have used the methodology of field anthropology in excavations all around the world. Translations of their publications, or primary publications in English, have historically been scarce, however they are increasingly appearing (Murail et al., 2004; Nilsson Stutz, 2003a, 2003b, 2006; Pautreau et al., 2004; Peressinotto et al., 2004; Roksandic et al., 2006; Valentin et al., 2000; Zeitoun et al., 2004). Roksandic (2002) published an English-language review of the method and in 2006 Henri Duday published two book chapters in English, one of which is a translation by Christopher Knüsel and largely reiterates the key

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information in his 1990 article (Duday, 2006) and the second (Duday and Guillon, 2006) expands more on the techniques for field recording.

The ideal for burials to be analysed using the method is that they are primary and undisturbed by taphonomic processes other than decomposition. The movement of the skeletal elements during decomposition, regardless of burial context, is dictated primarily by gravity and the spaces created by the soft tissue decomposition. Beyond these universal influences, the burial context can either inhibit further movement or create larger spaces of variable extent and duration, allowing further movements. The position of the skeletal elements will therefore reflect both the original position of the body and the burial context.

Interpretation of the position relies on an understanding of the decomposition and skeletonisation of the human body. Surprisingly few studies have been dedicated to this specific topic (Manhein, 1997; Rodriguez and Bass, 1985). Clearly, controlled research is very difficult and most focuses on the characteristics of tissue decomposition using animal models, although these cannot replicate the movements of the human skeleton after decomposition. The most well-known experimental projects using human cadavers are those of the University of Tennessee anthropology research facility, also known as the 'Body Farm'. This is an outdoor laboratory designed specifically for the purpose of researching human body decomposition but the work conducted there is largely tailored to interpreting modern forensic cases (Bass, 1997). Graduate students from the University, many under time constraints, undertake this research. Bass suggests, "There is still a substantial need for long-term research projects on many phases of human decomposition" (Bass, 1997: 181).

### 3. Soft tissue decomposition

The soft tissues play an important role in determining the behaviour of skeletal elements during decomposition. The following is based on the publications of Duday et al. (1990a) and Duday (2006). Fibrous tissues, such as ligaments, are more durable than most other soft tissues and are therefore of most importance in Field Anthropology. Joints decompose at different rates depending on the number and size of ligaments. Labile joints are those that decompose the fastest. The most labile joints are generally small, including those of the hand, the toes and the cervical vertebrae, or with minimal ligaments, such as the scapulothoracic joint. Persistent joints are those designed to cope with significant biomechanical stress requiring substantial fibrous support. Examples are the atlanto-occipital articulation, and most of the joints of the lower body.

### 4. Soil matrix and the burial context

Again the primary source of the following is two of Duday's publications (Duday et al., 1990a; Duday, 2006), except where otherwise referenced. If the body is inhumed (interred without any covering), soil has the potential to replace the soft tissues as they decompose. This process can be confounded by a number of soil characteristics, including its integrity, compaction and moisture content. Dry or fine-grained soil can continuously replace the soft tissues as they decompose, stabilising the bones. Evidence of this is the perseverance of joints in unstable positions, such as those of the hands and feet, in proper anatomical articulation. Despite the stabilising effect of the soil, there will still be some degree of reduction and compaction in parts of the body as decomposition progresses, especially in the chest, and some elements will move due to the asymmetric pressure from the collapse of surrounding elements. These movements include collapse and flattening of the rib cage,

possible misalignment of the vertebral column and disarticulation of the hips at the sacroiliac joint.

If the sediment is clay or granular a temporary space forms as the soft tissues decompose and are not immediately replaced. Bones in unstable positions will move, such as in the space provided by a coffin, described below. This movement may be accentuated when the sediment eventually collapses into the cavity.

A body interred in a slowly decaying architectural feature such as a wooden coffin is in a relatively long-lasting space that delays the infiltration of soil. The construction and permeability of the coffin have an effect on the duration of the space and therefore on the movement of bones. The effects on the decomposing body of a well constructed, durable coffin are easily distinguishable as the bones disarticulate readily under the influence of gravity. The clearest evidence of this is disarticulation at persistent joints between bones in unstable positions, including the pelvis. The femora rotate laterally out of the acetabular sockets and the patellae disarticulate and are displaced. In young people, even the cranial vault may disarticulate at the sutures. Duday et al. (1990b, Figure 2: 17) excavated an individual in the preserved remains of a coffin constructed out of a hollowed out tree trunk at Nordhouse (Lower Rhine) that clearly shows these effects. A poorly constructed, less durable coffin will allow infiltration of soil after a shorter interval so the skeleton can have areas of disarticulation along with some perseverance of articulation similar to that of an inhumation. The shape and the width of the coffin (Rodwell, 1981, Figure 71A: 151), and whether it had a flat bottom (Boddington, 1987, Figure 4.5: 32) or was curved such as with a hollowed out tree trunk (Duday et al., 1990b, Figure 2: 17; Pautreau et al., 2004, Figure 170: 97, Figure 175: 99), will have an effect on the movement of elements as bones that would have otherwise moved may be stabilised or supported.

Where a body was wrapped before interment, the permeability and rate of decay of the wrapping determine the effect on movement of skeletal elements. If the wrapping decays faster than the soft tissues, or is permeable to soil, the effects may mimic an inhumation. If the wrapping decays more slowly than the soft tissue, it can create a temporary space around the decomposing body, resulting in minor movements of small elements or labile joints (Murail et al., 2004; Peressinotto et al., 2004; Valentin et al., 2000). The durability of the wrapping is clearly of significance in controlling movements as, firstly, labile and then persistent joints decompose.

In addition to the effects of the texture of the soil and the creation of either temporary or semi-permanent spaces, the body may be constrained by grave width and length, tightness of wrapping (Nilsson Stutz, 2006), or coffin size and shape. With a narrow grave or coffin or tight wrapping, the skeleton can have a linear arrangement of the limbs. Constriction at the shoulders and hips can create bilateral pressure, resulting in the clavicles moving from their normally almost transverse plane to lie almost in the sagittal plane (verticalisation), the scapulae become more obliquely angled, the humeri medially rotated, the rib cage collapsing inferiorly and medially and the pelvic girdle retaining articulation. Decomposition of a body in a wide space created by a generous coffin or loose wrapping in a wide grave shows the opposite effects. There need be no linear alignment or constriction, the clavicles, scapulae and humeri maintain anatomical position, and the pelvis disarticulates.

The position or orientation of the articulated skull is often assumed to reflect the original position at interment. A detailed examination of the cervical vertebrae can clarify whether there had been any movement following decomposition. The temporomandibular joint is labile and movements of the mandible are treated separately to movements of the cranium. The atlanto-occipital

articulation is persistent but the cervical articulations are labile. Continuity in spatial alignment and orientation of the cervical vertebrae suggests intentional placement but dislocation indicates that the cranium has disarticulated and rotated during decomposition. Disarticulation often affects the intervertebral space between the atlas and axis but more commonly the axis and third cervical vertebrae or the more inferior vertebrae. The cervical vertebrae are often obscured when the skeleton is *in situ*, so detailed recording following the lifting of the cranium and mandible is necessary to identify any post-depositional movement.

Another contributor to movement of skeletal elements can be items within the grave. In addition to the movement of skeletal elements during decomposition, elements can move later into spaces created by perishable items that decompose more slowly. These items may be in or around the burial, such as a wooden headrest under the cranium. An example is observed in a burial from Barton-Upon-Humber (Rodwell, 1981, Figure 71A: 151). The individual was buried in a coffin with flint boulders supporting the head on either side but with the decomposition of the labile cervical vertebrae the cranium rolled backwards. The decomposition of a bier, coffin base or other wooden support under a burial could create an uneven surface under the bones, allowing them to move into the spaces created.

The effects of individual characteristics of burial context on the ultimate position of the skeleton sound logical but it is also clear that there are many combinations and permutations that may produce the same outcome. For example, a burial tightly wrapped in a durable fabric could ultimately result in the skeleton being in the same position as a burial in a narrow coffin of soft wood. A body both wrapped and interred in a coffin could have any number of a range of characteristics depending on the durability of the coffin and the wrapping, the size and shape of the coffin and the tightness of the wrapping and, ultimately, on the texture of the soil. Without the preservation of any physical architectural evidence, field anthropologists must be meticulous to record the precise position of the bones so it is possible to at least attempt to differentiate between alternative variables to conceptualise the burial context. Clearly essential to success is the presence of a biological anthropologist during the excavation to undertake this recording.

Complicating the picture still further, natural processes can also disturb (or destroy) individual bones. Considerable displacement and movement of smaller elements, including the hands and feet, the sacrum, the sternum, the ribs, the vertebrae (usually the cervical or inferior lumbar) and the cranio-facial region often exceed that expected from burial context. Dudgeon (2006) suggests one possible cause is inundation from a rising water table, which can cause bones to 'float'. Whatever the cause of the movement of the elements, he cautions that movements to this degree could only have occurred in a context without soil since any matrix would have been restrictive.

Bioturbation, the mixing of the soil matrix at a site through microbial or insect activity, or burrowing by larger animals, can also result in bones being moved. Our personal experience has shown this is particularly a problem in tropical climates and sometimes produces unusual effects that can mimic those created by the burial context.

The duration of the interval from death to interment can also be a factor. Archaeologists working in mediaeval cemeteries in the United Kingdom observed movement of skeletal elements in the thoracic area that they called 'tumbling' (Boddington, 1987; Brothwell, 1987). The skeletons in these graves appear to have decomposed in a narrow space but have skeletal elements that are unusually disarticulated and displaced. It has been suggested that these were coffin burials and that the movement occurred when the coffin was moved sometime after decomposition began (Brothwell, 1987). Brothwell (1987) also drew an analogy between

'tumbling' and the positions of bones he observed on radiographs of mummies, which he suggested might have occurred when the mummies were moved. However, it is possible that this 'tumbling' is the result of inundation by water as discussed above. An example of this movement is a coffin burial from a waterlogged area in the UK (Rodwell, 1982: Plate XLIII).

## 5. The application of field anthropology to southeast Asia

The sites used in this study, Ban Lum Khao and Noen U-Loke, are located in the upper valley of the Mun River, Lower Mekong Basin, Northeast Thailand, and were excavated between 1996 and 2004.

### 5.1. Ban Lum Khao

The cemetery at Ban Lum Khao was in use from c1275–c500BC and is classified as Bronze Age. The details of the excavation and findings have been fully reported in Higham and O'Reilly (2004). The excavation area was 10 m × 14.5 m, to a depth of c. 1.85 m. The majority of the deposits represented a cemetery, with an orderly distribution of burials. There was minimal occupation debris in the surrounding matrix and the burials were largely undisturbed by later human activity. The burial sample totalled 110, including 59 adults (Domett, 2004).

Previous analyses of mortuary practices defined three distinct mortuary phases (MP) on the basis of depth, orientation, superpositioning and burial goods (Higham and O'Reilly, 2004). O'Reilly (2003) defined grave goods as wealth. On the basis of variation in wealth he suggested that the community does not fit the model of an egalitarian society but also as there was no pattern of distribution by age, sex or location, that this was a heterarchical, rather than hierarchical, community.

### 5.2. Noen U-Loke

This is an occupation and cemetery site dating from c 400BC–500AD and is classified as Iron Age. The details have been fully reported in Higham et al. (2007). A total of 120 individuals, including 67 adults, were recovered during the excavation (Tayles et al., 2007) of an area of 14 × 17 m to a depth of c. 5 m. Burials were scattered in the lower levels, interred in clusters for the majority of the deposits, and scattered in the latest burial phase. Many of the burials were disturbed by superpositioned interments or by other human activities. Some graves had been filled with unthreshed rice (Higham et al., 2007; Tayles et al., 2007), which had the unfortunate effect of demineralising the bone tissue. In these cases the position of the bones could sometimes be determined but in others the damage was too great to permit their inclusion in this research.

There was more spatial and chronological variation in mortuary practices at Noen U-Loke than at Ban Lum Khao. Five mortuary phases were identified, again on the basis of burial orientation, grave goods, or depth of burial (Higham et al., 2007). The earliest phase included items of material culture that were similar to those in the upper levels of the Ban Lum Khao cemetery but several graves also contained iron objects. The middle phases of burial clusters saw considerable variation in quantity and quality of grave wealth both within and between clusters. There were some very wealthy individuals with numerous items, both decorative and functional, including gold, silver, bronze, iron, glass, stone and shell. Exotic items became more common. Some clusters had 'rice-bed' burials and others had whole pig skeletons in the graves. By the later phases grave wealth had become less variable and reduced in quantity. Rice-bed burials ceased.

The social organisation at Noen U-Loke appears more complex than at Ban Lum Khao. The site is surrounded by so-called 'moats' (although these were probably not defensive structures but rather

for water control), the construction of which would have required considerable organisation (Boyd, 2007). The changes over time suggest a change in social structure from heterarchy towards hierarchy (Talbot, 2007).

## 6. Methods

As the research on which this paper is based began after completion of the excavations, the assessment of skeletal position was of necessity based on photographs. Published reports and field notes provided additional information. The quality of the photographic images varied because of the technology in use at the time of the respective excavations. This impeded the study in cases where the exact position of the individuals was not distinguishable, with the effect of both reducing the sample size and precluding detailed interpretation of all skeletal elements. It is acknowledged that this use of photographs rather than recording *in situ* is not the ideal of Field Anthropology but does not invalidate the study, as Nilsson Stutz (2003a, 2003b, 2006) shows.

As the sites are located in a monsoonal, tropical environment, the rich biota and dynamic climate ensured that the natural processes of bioturbation and a seasonally variable water table were acting on the burials to a greater or lesser extent. The best preserved skeletons, both quality of bone tissue and completeness of the skeleton, were those in graves cut into the natural substrate at the base of each site.

The samples were selected on the basis of completeness of the skeleton and the quality of the photographs. The Ban Lum Khao sample of adult burials was reduced to 26 and the Noen U-Loke sample to 34. Sex and age-at-death estimates were available for both sites (Domett, 2004; Tayles et al., 2007).

The first stage was the detailed recording of the positions of the bones, including their articulations. Based on Duday et al.'s (1990a) seminal paper, a list of skeletal characteristics relating to burial contexts was drawn up and initially used in drawing inferences. It became clear that the interpretation was too complex to be based

on a list so the flow chart in Fig. 1 was drawn up to show how multiple possible interpretations were considered. This chart was based on a range of studies (Boddington, 1987; Brothwell, 1987; Duday, 2006; Duday et al., 1990a; Murail et al., 2004; Nilsson Stutz, 2003a, 2003b, 2006; Pautreau et al., 2004; Peressinotto et al., 2004; Rodriguez and Bass, 1985; Rodwell, 1981, 1982; Rogers et al., 2004; Roksandic, 2002; Valentin et al., 2000). The skull position was not able to be included as the position of the cervical vertebrae was frequently obscured in the photographs.

## 7. Results

The composition of the samples from each site is shown in Table 1. The imbalanced sex ratio at Ban Lum Khao is purely a sampling effect as it was relatively even in the complete sample. The large proportion without sex estimates at Noen U-Loke is a reflection of the poor preservation in the 'rice-bed' burials.

### 7.1. Ban Lum Khao

The 26 interments at Ban Lum Khao appear to have been interred in two different contexts, either wrapped or in coffins (Table 2).

The skeletons in the first group of nine females and five males were complete and relatively well articulated with minor movement of skeletal elements consistent with the effects of decomposition within the volume of the body. These included collapse of the rib cage and movement of individual vertebrae. They also showed signs of constriction (Fig. 2) with alignment from the shoulders, the widest part of the body, to the feet, and no elements outside this alignment. Some had the upper limbs on the alignment and the hands beside the pelvis, others had only the humeri on the alignment and the elbows loosely flexed so the hands were over the pelvis or the femora. The hands in an unstable position over the pelvis or femora had disarticulated, indicating that the soft tissues were not immediately replaced by soil. They all had constricted

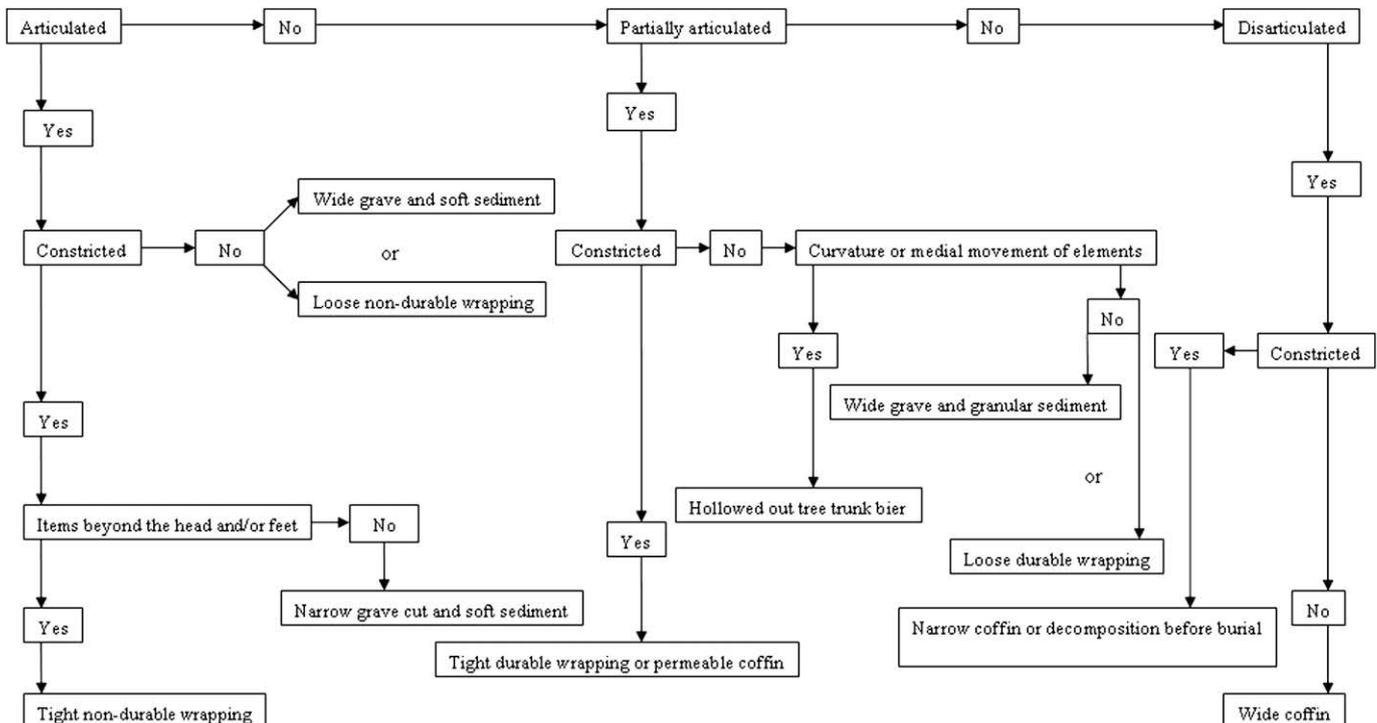


Fig. 1. Flow chart illustrating the method used in applying principles of Field Anthropology.

**Table 1**

The composition of the samples at each site by age and sex.

	Ban Lum Khao		Noen U-Loke	
	<i>n</i>	%	<i>n</i>	%
Males	6	23	14	41
Females	20	77	12	35
Unknown sex	0	0	8	24
Total	26	100.0	34	100.0

shoulders, verticalised clavicles, articulated pelvis and no rotation of the lower limbs. Most of the feet were plantarflexed, either from anatomical position or lying on the lateral side. Others were disarticulated, suggesting that they were supported in anatomical position at the time of burial. As with some of the hands, the disarticulated feet suggest the soft tissues were not immediately replaced by soil.

A very narrow grave, a narrow coffin, or tight wrapping could theoretically have caused the alignment of limbs and constriction of the shoulders and pelvis. However, the minimal disarticulation, except for the labile joints of the hands and feet, suggests that although the soft tissues were not replaced immediately they were replaced relatively soon after burial. In cases where the feet were still articulated but plantarflexed or in an unusual position, the presence of pots in the grave beyond the feet suggests that something other than the grave cut was controlling the position of the feet. This supports the idea of a tight wrapping that survived long enough to allow decomposition of the labile joints, but decomposed before the more persistent joints. It is possible that these individuals were wrapped in some kind of woven, fibrous matting or the inner bark of a tree.

One burial in this group (Fig. 3), had moved more than the rest but less than would be expected in a coffin burial. The left elbow was loosely flexed and although the right limb was extended, this appears to have been a reflection of postmortem movement with medial rotation of the long bones, as both forearms had slipped away from the hands, which remain articulated on the abdomen. The pelvis was disarticulated at the sacroiliac joint but the left *os coxae* remained in anatomical position with the ilium, fibula and foot in alignment. The right ilium has flattened, the right femur rotated out of the acetabulum and the foot is lying plantarflexed on the lateral side. A possible explanation is that the body was loosely wrapped and laid slightly diagonally on a bier with a concave base, such as a tree trunk, as discussed below. This could account for the asymmetry in the limb positions and postmortem movements but not for the maintenance of labile joints such as those of the hands and feet in remaining in articulation. This burial remains an enigma as it is difficult to envisage a combination of wrapping and placement that would allow large joints to disarticulate while preserving the small joints. The burial was spatially close to others so there is no basis for invoking unusual taphonomic conditions as an explanation.

The second group of 11 females and one male shows a greater range of movement of skeletal elements, especially in the thoracic area, with disarticulated vertebrae and ribs (Fig. 4). The femora had

**Table 2**

Estimates of burial context at Ban Lum Khao.

	Males		Females		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Wrapped	5	83	9	45	14	54
Coffin	1	17	11	55	12	46
Total	6	100.0	20	100.0	26	100



**Fig. 2.** Ban Lum Khao Burial 49, illustrating the constricted position of the first group of wrapped burials.

rotated laterally out of the acetabular sockets, the tibiae had disarticulated from the femora and many of the foot bones were disarticulated. They also show signs of bilateral constriction with some pelvis still articulated and others with bones displaced and dispersed in a restricted, narrow area. The movement of the skeletal elements suggests that these individuals were buried in a narrow coffin that prevented the replacement of soft tissues with soil. The movements of the skeletal elements are those expected if the body decomposed in a context without sediment, except for the maintenance of the pelvis in articulation. It is possible that the narrow coffins had a laterally concave base such as a hollowed out tree trunk, as seen in other areas of Thailand (Pautreau et al., 2004). This could have been supporting the pelvis in articulation but permitting the disarticulation of other joints. While these burials show similar rotation and disarticulation in the lower limbs and feet to log burials at Ban Wang Hai (Pautreau et al., 2004, Figure 170: 97) the movement of elements in the thoracic area is more accentuated, suggesting that there was some additional taphonomic factor involved such as inundation during the wet season.

Another possibility is that as part of the mortuary ritual these individuals were wrapped but left for a period before being buried. If they were in a relatively advanced state of decomposition before burial, the result could have been 'tumbling' with some disarticulation but the strong, persistent ligaments of the pelvic girdle retained.

## 7.2. Noen U-Loke

The burial context appears to have been universal at this site. All 34 showed evidence of constriction (Fig. 5). These burials have most of the characteristics of the first group at Ban Lum Khao, with the exception that where the hands could be assessed they were



**Fig. 3.** Ban Lum Khao Burial 52, which appears to have been loosely wrapped and laid against the side of the grave.

articulated, even in unstable positions such as on the pelvis (Fig. 6). This is evidence for burial soon after death and the continual replacement of the decomposing soft tissues with soil. This suggests that either they were inhumed directly in a narrow grave, or were wrapped in nondurable material that decomposed before the soft tissues. As at Ban Lum Khao, many individuals' feet were plantarflexed or positioned in an unnatural way (e.g. Fig. 7), which supports the idea of a wrapping. The placement of pottery beyond the head and feet in graves at Noen U-Loke shows that the end of the grave did not determine the position of the feet.

As at Ban Lum Khao, there was one individual (Fig. 8), with evidence of movement beyond that expected in a wrapped burial but with characteristics of rapid replacement of the soft tissues, so burial in a coffin is unlikely. There was no linear alignment of the skeleton. The ribs were flattened and the left sacroiliac joint was disarticulated but the right remained articulated. The lower limbs had rotated laterally out of the acetabular sockets. The forearms had moved away from the hands, which were in articulation. This is interestingly similar to the loosely wrapped individual, Burial 52 at Ban Lum Khao. Its position at the base of the Noen U-Loke site suggests that it could have been contemporaneous with the later burials at BLK.

## 8. Discussion

The evidence from these two sites suggests that, in contrast to the increasing variation in other aspects of mortuary practices and social organisation in the upper Mun River Valley during late prehistory, the aspects of burial mode identified using the



**Fig. 4.** Ban Lum Khao Burial 59, illustrating the movement of some bones and pelvic constriction of the second group of burials, which were probably in narrow coffins or on a curved bier.



**Fig. 5.** Noen U-Loke Burial 62, a constricted burial, apparently wrapped in a more durable material than at Ban Lum Khao.



**Fig. 6.** Noen U-Loke Burial 36, a wrapped burial illustrating the retention of the hand bones in articulation despite being in a potentially unstable position, unlike the Ban Lum Khao example.

techniques of Field Anthropology became more uniform over time. There were at least two modes of burial, wrapped or in coffins, at the earlier site of Ban Lum Khao during the period of 1300–500BC but in the following millennium at the later site of Noen U-Loke, all burials appear to have been wrapped regardless of grave wealth or whether or not the grave was filled with rice.



**Fig. 7.** Noen U-loke Burial 27. A wrapped burial showing the feet held in position.

The variation in burial context at Ban Lum Khao appears to be sex-related as all coffin burials except one were females, although confidence in this observation is confounded by the imbalanced sex ratio in the sample. This also prevented determination of whether age may be a factor in the choice of burial context as the small male sample was mostly old age. The date of burial could be a factor, as in MP1 and MP2 burials were a mix of wrapped and coffin but the small sample in MP3 is entirely wrapped. Consideration of other aspects of mortuary treatment shows that the only coffin burial in MP1, B64, was richer than the wrapped burials but as it was the only burial in this phase completely undisturbed by later interments, this is a cautious observation. In the larger sample from MP2, there is no apparent relationship between grave wealth, as represented by artefact quantity or quality, and burial context. In all phases there is no apparent pattern of burial context in relation to location within the square. These relationships were tested statistically employing the Chi-Square test with Fisher's Exact to compensate for the small sample sizes. There were no significant results, although this most likely reflects the small sample sizes. The  $p$ -value of the difference in burial context, either wrapped or in a coffin, between males and females was  $p = 0.170$ , between age ranges was  $p = 0.617$ , and between the mortuary phases was  $p = 0.094$ .

This interpretation has been possible despite the limitations imposed by the necessity to use photographs and the consequent reduction in sample sizes. This outcome shows the potential of precise recording of the position of skeletal elements during excavation by bioarchaeologists with the knowledge and skill to do the recording. Another crucial requirement in achieving the maximum value from field anthropology is the careful excavation of



**Fig. 8.** Noen U-Loke Burial 26. This skeleton shows similar characteristics to the loosely wrapped Burial 52 at Ban Lum Khao (Fig. 3). The area of the left shoulder and cranium was disturbed by a later posthole.

the skeleton so that no bones, especially the small bones of the hands and feet, are moved.

If applied systematically, the methods of field anthropology can contribute an otherwise invisible aspect to mortuary rituals at archaeological sites, providing a more thorough interpretation than possible through the use of material culture alone. The more this innovative method is used and refined and the implications understood, the stronger the potential for a deeper understanding of mortuary practices.

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